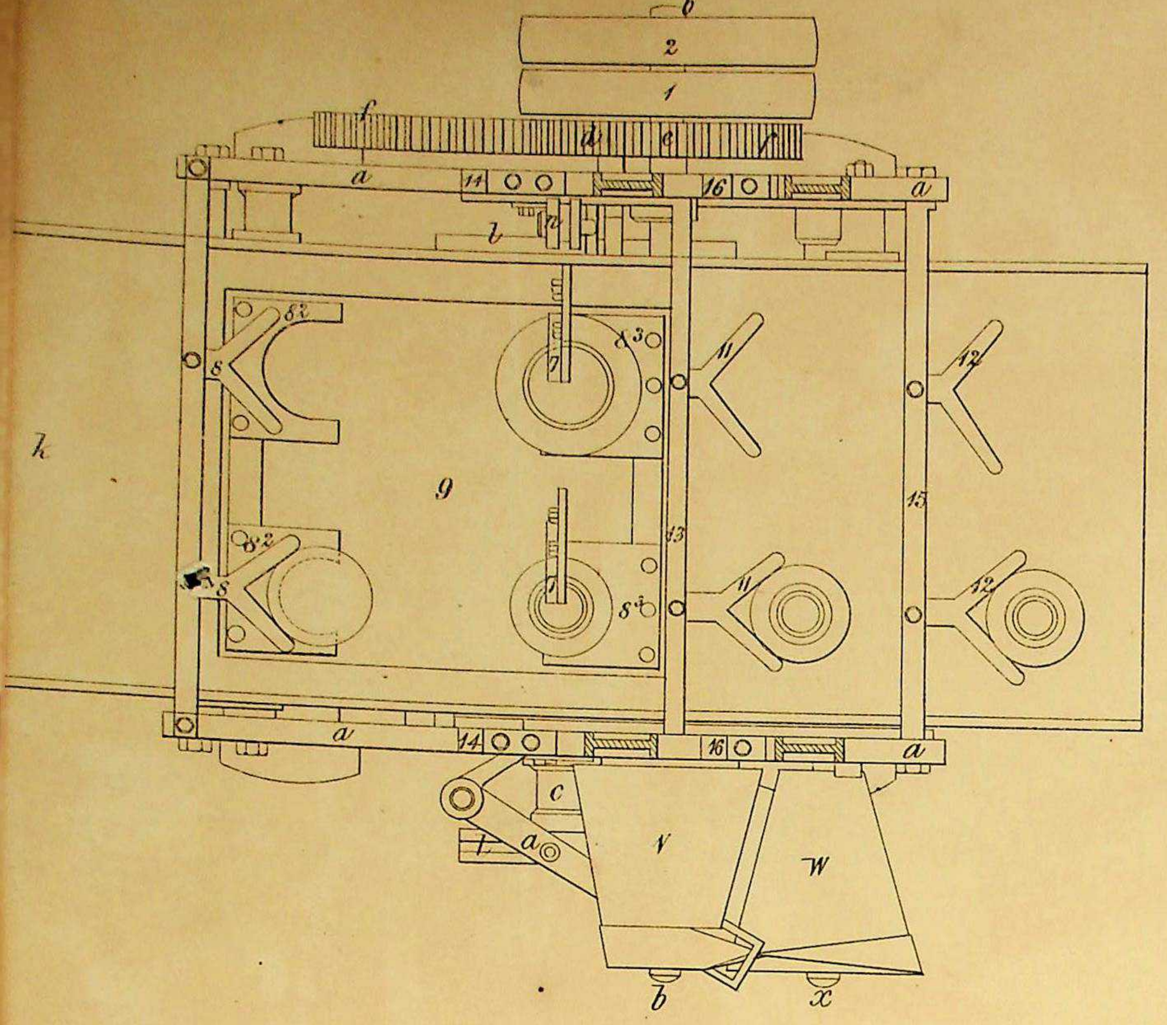


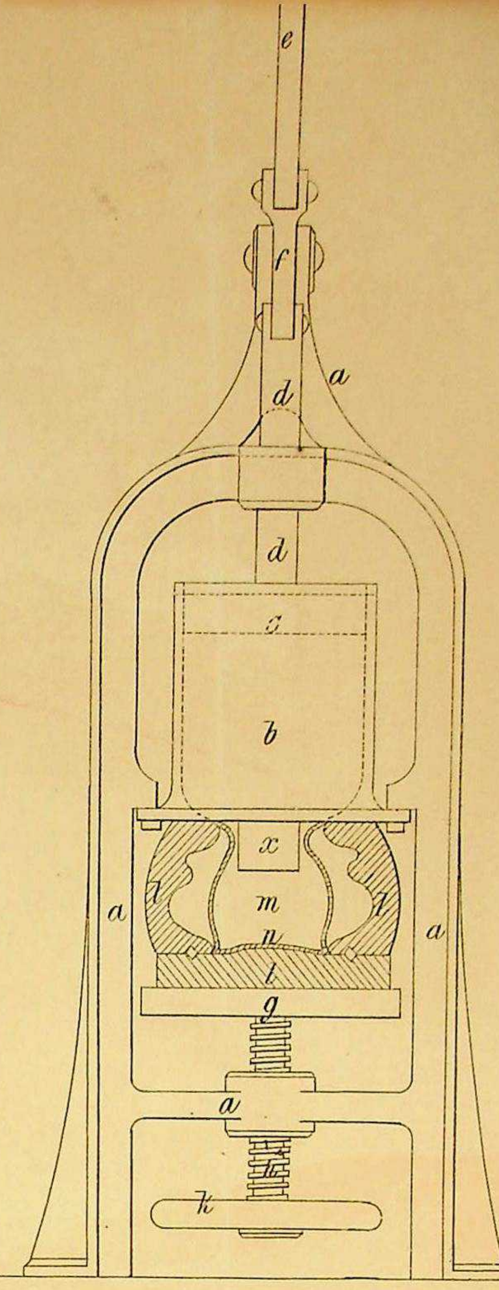
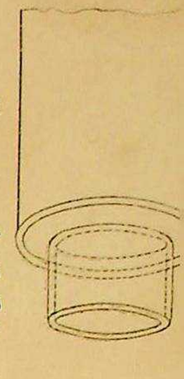


FIG. 9



English 9901 of 1843
Mall

Press

2/24

FIG. 13

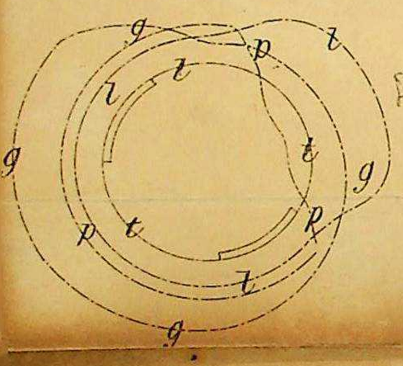


Diagram of cams of fig. 6.

FIG. 14

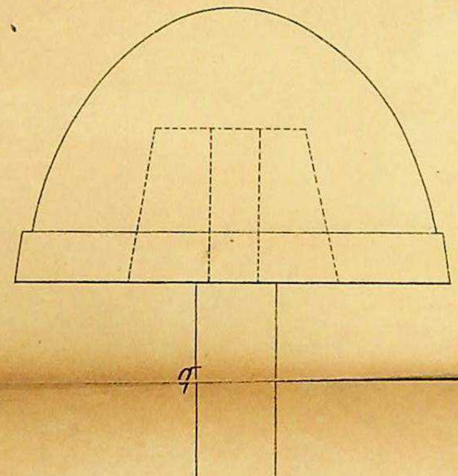
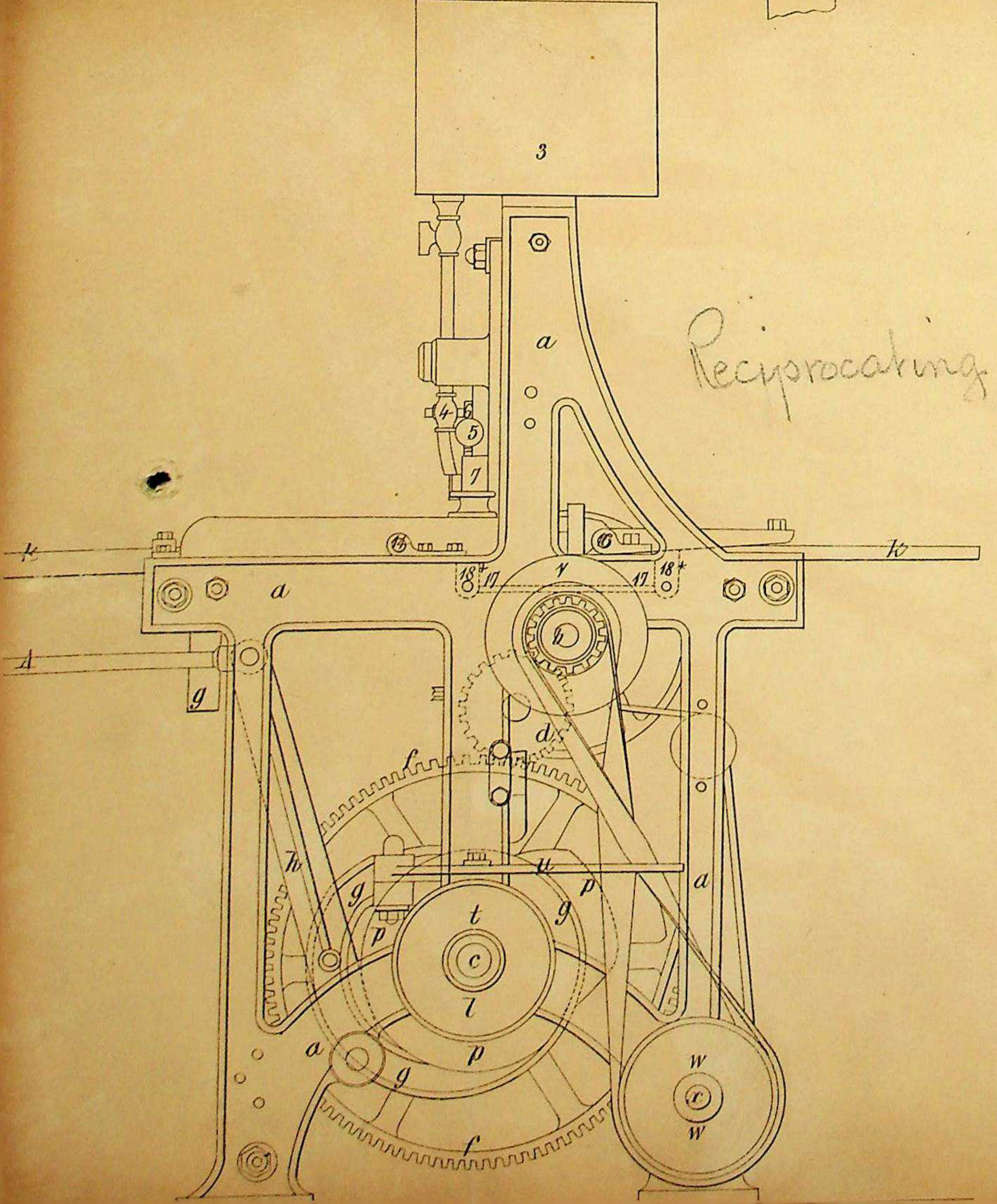
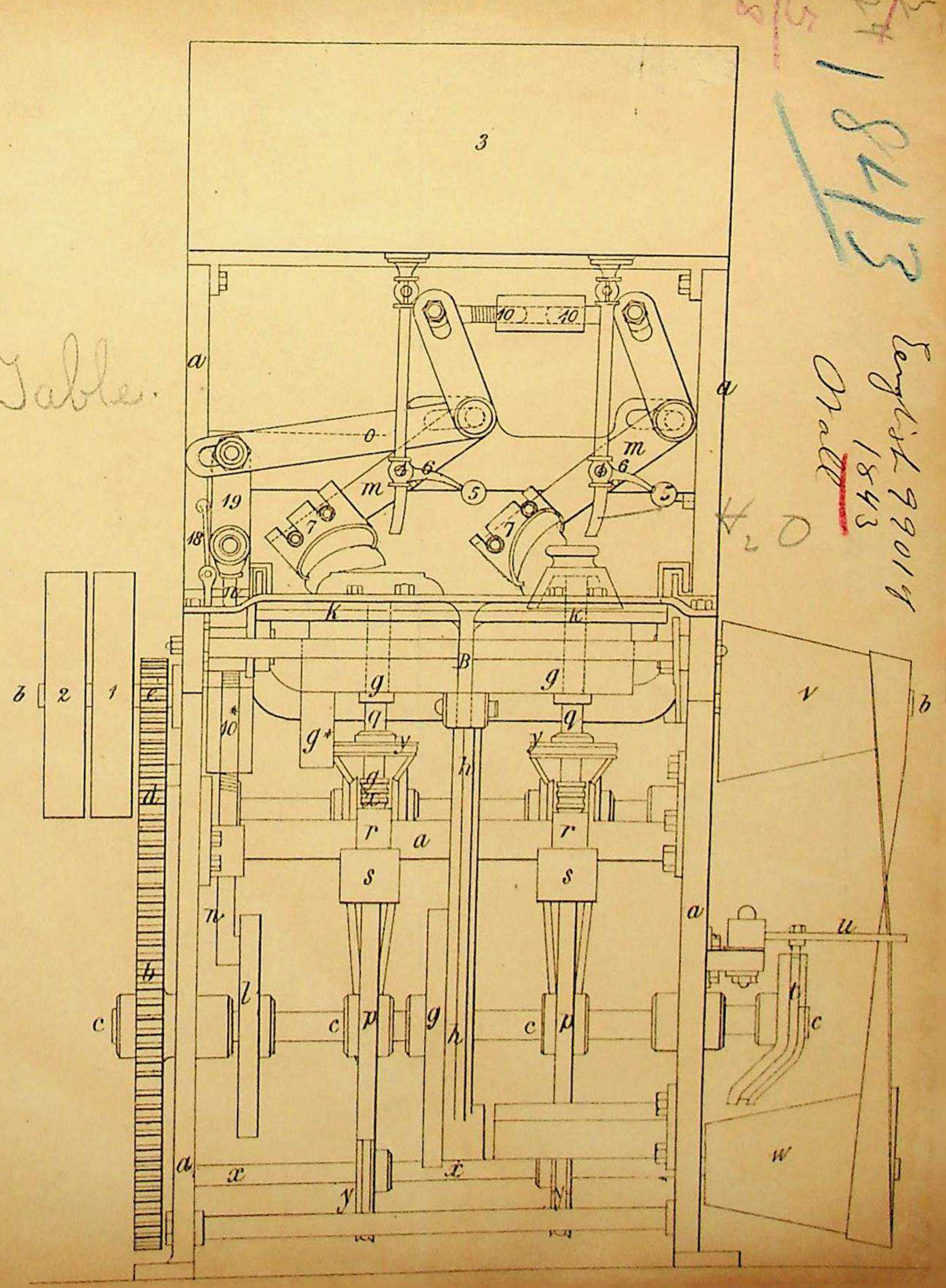


FIG. 6.



Reciprocating Table.

FIG. 5.



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English 9901 of
1843
Mall

15

A.D. 1843 . . . . N° 9901.

Manufacture of Earthenware, China, &c.

WALL'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, George Wall, Junior, of Manchester, in the County of Lancaster, Gentleman, send greeting.

WHEREAS Her present most Excellent Majesty Queen Victoria, by Her Royal Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Fifth day of October, in the seventh year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said George Wall, Junior, Her especial licence, full power, sole privilege and authority, that I, the said George Wall, Junior, my executors, administrators, and assigns, and such others as I, the said George Wall, Junior, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein mentioned, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick-upon-Tweed, my Invention of "Certain Improvements in the Methods or Processes of Manufacturing Earthenware, China, and other similar Substances, and also in the Machinery or Apparatus applicable to such Manufactures;" in which said Letters Patent is contained a proviso obliging me, the said George Wall, Junior, by an instrument in writing under my hand and seal, particularly to describe and ascertain the nature of my said Invention, and in what manner the same is to be performed, and to cause the same to be enrolled in Her Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said in part recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

NOW KNOW YE, that in compliance with the said proviso, I, the said George Wall, Junior, do hereby declare that the nature of my said Invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the Drawings hereto annexed, and the following explanation thereof (that is to say) :—

My Invention consists of certain improvements in the methods or processes of manufacturing earthenware, china, and other similar substances, whereby machinery may be more easily and efficiently adapted to such manufactures than by the methods at present in use. And also of improvements in machinery or apparatus applicable to such manufactures. These improvements are designed to effect a reduction of labour and time, and to obtain greater uniformity in the thickness of the ware, with greater compactness or solidity of the material used. These improvements will be more readily understood by the explanation of the construction and operation of the various machines employed.

Having thus stated generally the objects of my improvements, I proceed to shew the manner in which the same are to be performed, and in order that the several features of novelty may be clearly perceived, I have attached to these Presents three Sheets of Drawings representing the machinery which I employ, having marked the same with letters and figures of reference, and have attached to the same parts of each machine the same letters and figures in all the views of it.

DESCRIPTION OF THE DRAWINGS.

Sheet 1 : Figure 1, is a front elevation of a machine for making what are termed " bats " of clay, and for depositing and, where necessary, fixing them on moulds in order to receive the required form or shape ; Fig. 2 is a side elevation of the same ; Fig. 3, a horizontal view as seen from above ; and Fig. 4, a vertical section taken through about the middle of the machine, in the position of Fig. 2. These Figures are drawn to a scale of about two inches to the foot. *a, a, a,* is the frame of the machine ; *b*, a cylinder into which the clay to form the bats is to be put, and is fitted into a part of the frame so that it may be removed from the machine when empty to be replaced ; *c* is a piston for forcing the clay out below the bottom of the cylinder ; *d* is a rod with a screw or thread round it, which rod is affixed to the piston and slides through a guide bracket above. The rod works in a screw box formed in a pinion *e*, so that by turning this pinion the rod *d* and piston *c* may be raised or depressed ; *f* is a driving pulley, and may be substituted by a winch ; *g*, a pinion upon the same axle, taking into a wheel *h* upon a shaft below (see

Figures 1 and 2), to give rotary motion to this lower shaft, at the inner end of which a bevel pinion *i* is fixed, taking into a corresponding bevel pinion *k* upon a short vertical spindle *l*. To the upper end of this spindle *l* a crank arm *m* is fixed, having a pin or stud *n*, which takes into a slot in the sliding table *p*, *p*, the form of the slot being shewn by dots in Fig. 3; hence it will be perceived that by the rotation of the toothed gear described, the revolving crank arm *m* and pin *n* will cause the table *p*, *p*, supported by the four lugs *q*, *q*, *q*, *q*, as seen at Fig. 3, to move reciprocally on the horizontal rods *r*, *r*. This table I call the feeding table, as the mould intended to receive the "bat" of clay from the bottom of the cylinder is placed upon it, as shewn at A, and it carries that mould and bat of clay onward to be acted upon by the pressing apparatus, as shewn at B in the section Fig. 4. The counter presser by which the bat of clay is to be fixed upon the mould consists of a stationary concave part C, C, fixed by a transverse bar *s*, *s*, to the framework, which bar may be adjusted and a centre or moveable part D, capable of rising and falling, as shewn in section; Fig. 4. A horizontal plate *t*, *t*, is fixed upon a vertical sliding rod *u*, and is lifted occasionally by the action of a bent lever *v*, working on a fulcrum pin in the lower part of the frame, as seen in Fig. 4. This lever *v* is raised at the periods required by a cam *w* upon the shaft of the wheel *h*. E is a shaft mounted perpendicularly in the frame, capable of turning or vibrating, and carries a toothed wheel F, and also a ratchet wheel G, which wheels are made fast together and turn loosely on the shaft E. From the upper end of this shaft E, and affixed to it, an arm H extends, carrying a spring catch *x*, which takes into the ratchet wheel G. From the lower end of the same shaft E, and affixed to it, extends a double-armed lever I, I, which is shewn detached in two positions in the auxiliary Figures 10 and 11, their corresponding positions being shewn by dots in Figures 1 and 3. The upper or short arm of this lever I is acted upon by the stud *z* in its motion from right to left, and which causes the ratchet catch *x* to take up a certain number of teeth on the ratchet wheel, and the lower arm of this lever under the table is acted upon by the pin *u* in its motion from left to right, which causes the piston *c* to descend by means of the catch *x* carrying round the wheel F and pinion *e*. *y* is a wire or string for cutting off the clay protruded below the bottom of the cylinder occasionally by the descent of the piston *c*. This wire or string is stretched between the two ends of an arm or lever K, and is kept tight by a spiral spring, as shewn in Fig. 1, and also in the detached Fig. 12. *z* is an adjustable stud set on the table *p*, and is designed to act against the upper arm of the lever I on the shaft E, as described before, and also to move the arm or lever K by taking into the forked part, as seen in Fig. 12, and thus the wire or string *y* is made to cut off the "bat" or slice of clay, as described. The mode of working this machine is as follows:—The parts of the machine being in the position shewn in the several Figures of the Drawing, and the pulley *f* or winch being set in motion in the direction indicated by the arrow seen in Fig. 2, the crank arm *m* will be made to revolve by means of the toothed wheel and pinions *g*, *h*, *i*, and *k*, and thus the table *p* will receive first a backward movement (from right to left), the stud *z* moving the cutter lever *k* along the bottom of the cylinder, and causing the wire or string *y* to cut off the clay protruding from it, as shewn in the Figures 1, 2, and 4, in which the bat of clay is represented as falling by its own weight after being separated by the cutter *y*. The "bat" being cut off, the table reverses the direction of the motion and begins a forward movement, the stud *z* moving the lever *k* along the bottom of the cylinder; the pin *n* then acts on the lower arm of the lever I, I, causing the piston *c* to descend as described, and thus forcing a certain quantity of clay to protrude from the bottom of the cylinder, proportioned in thickness to the number of teeth taken up by the catch *x* of the ratchet wheel, which may be varied as desired by adjusting the stud *z*. By this movement of the table the mould in the position A will be carried forward to be acted upon as shewn at B in Fig. 4, and the stud *z* will have carried the cutter *y* along the bottom of the cylinder, as described prior to the descent of the clay. When the table returns, another mould is placed in the position A, the stud *z* again moves, the cutter lever *k* and wire *y* cutting off the clay which has been protruded from the cylinder, and thus produces a "bat" which falls on the mould placed to receive it, as before described, and the parts of the machine are again in the position shewn in the Drawing. The stud *z* again causes the ratchet to take up a regulated number of teeth as before, and whilst the same operation is being repeated the forward movement of the table conveys the mould with the "bat" lying upon it over the presser plate *t*, which is raised at the proper time by the lever *v* being acted upon by the cam *w*, and lifts the mould and "bat" into the position as shewn at B, Fig. 2. It will be seen that when the presser *t* lifts the moulds and "bat" into the counter presser the "bat" of clay will come in contact first with the moveable or central part D, which drives out the air from the middle, and fixes the "bat" of clay to the mould first in that part; it then comes in contact with the fixed or concave part of the counter presser C, which presses it all round and fixes the "bat" firmly on the mould. During this operation the table has returned to its farthest point to the "left," and the mould is again delivered on to it as the presser *t* recedes, and is taken onwards by the next movement of the table, and may then be removed from the machine. It will be understood that these two operations are going on at the same time. It is evident that the "bats" may be made of any size required, by having a larger or smaller cylinder; or the same cylinder may be used for producing different sized "bats," having suitable false bottoms to fit the cylinder, each with different sized openings, according to the size of "bat" to be forced through it. The "bats" may be made also of any required shape, round, oval, square, or other form, by varying the shape of its opening at bottom, or by substituting a suitable vessel instead of a cylinder. The thickness also may be varied by adjusting the stud *z* as explained.

I would remark, in respect to this part of my Invention, that I am aware that tiles have been made by causing clay to be forced upwards and protruded through a suitable apparatus, and then cut off by a wire and removed by hand; and I mention this circumstance in order to state that I do not claim the same.

The peculiarity of this part of my Invention consists in causing the "slices" or "bats" of clay to be forced downwards through a suitably shaped orifice, so as to fall on to a mould or surface when cut off, and so as to allow of the next operation being performed thereon without handling the "bat;" and it will be evident that the receiving mould or surface below will be varied according to the article to be manufactured therefrom.

Figure 5 represents a front elevation of an improved arrangement of machinery, whereby "bats" of clay are formed into such like circular articles or ware as cups, saucers, basins, &c., by means of a revolving spindle, and the use of a "profile," being an improved arrangement of apparatus, but similar in some respects to that specified under my former Letters Patent granted by Her present most Excellent Majesty, bearing date at Westminster, the Eleventh day of January, One thousand eight hundred and forty, the Specification of which was duly enrolled in the Office of the Rolls Chapel. Figure 6 is a side or end view of the same, and Fig. 7 a horizontal view, as seen from above, and partly in section, in which all the parts of the machine above the profiles are removed, to prevent confusion. These Figures are drawn to a scale of about one inch and a half to the foot. *a*, *a*, *a*, *a*, is the frame of the machine; *b*, the driving shaft; *c*, the cam shaft; *d*, a carrier wheel which communicates the motion of pinion *e* to the wheel *f* on the cam shaft; *g*, a cam acting on a lever *h*, which moves the feeding table *k* to and fro by means of a link A and bracket B; *l* is another cam which moves the "profile" levers *m*, *m*, by means of the connecting rod *n*, and lever *o*, and double screw box 10; *p*, *p*, are cams which cause the rise and fall of the spindles *q*, *q*, by means of the steps *r*, *r*, which slide in the bearings *s*, *s*; *t* is a cam which acts on the strap guide *u*. These cams are more clearly explained by the Diagram shewn at Fig. 13. *v*, a cone pulley on the driving shaft *b*, which gives motion by a strap to the cone pulley *w* on the shaft *x*, and thence, by band pulleys *y*, *y*, gives a variable speed to the spindles *q*, *q*. 1 and 2 are the fast and loose pulleys which, if the machine is not to be driven by power, are to be substituted by a winch; (3) is a tank containing water; 4, 4, taps acted upon by the weights 5, 5, and the levers 6, 6, so as to give a supply of water on the clay whilst being shaped by the profiles; 7, 7, are iron cases having "profiles" fastened in them, and are screwed on the profile levers *m*, *m*. The detents or holders 8, 8, are affixed on a bar to the side frames of the machine, as is shewn. The table has a square opening through it, and has holders 8^2, 8^2, affixed to receive the moulds with bats thereon; 8^3, 8^3, are corresponding holders affixed at the opposite side of the opening through the table. Figure 6 and 7 shew the table as far as it will go towards the left; and Figure 7 represents one set of the detents occupied. On the other side only one mould is shewn, viz. that upon the spindle. The object of thus shewing the parts is to facilitate the workmen in understanding their mode of operating. (11) and (12) shew other angular holders or detents; and it should be stated, that all holders or detents should be readily moveable so as to be changed for different articles. The holders or detents (11) are fixed to a bar (13), which moves on axles at (14), (14), and the detents or holders (12) are affixed to a bar (15), moving on axles at (16), (16), and the bars 13 and 15 are connected together by the link (17) seen in Figure 6, attached by pin joints to projecting pieces (18^+) affixed to the ends of the bars 15 and 16. Motion is communicated to the bars 13 and 15 at the proper times to raise the detents or angular holders by means of the link (18), so as to allow the moulds, &c. to pass under them. The link (18) is attached by pin joints to the link (19), which gives motion to the profile levers and to one of the bars (13), as shewn. By this arrangement it will readily be understood that the workman places the moulds, with bats thereon, on to the holders 8^2, in the angular detents or holders (8, 8,); and by the movement of the table, the moulds and "bats" will be carried over the spindles *q*, *q*, which, by the action of the cams *r*, *r*, rise and take up the moulds and bats, at the same time giving them a rotary motion. These spindles have a cap on the top of them, as seen at Fig. 14, suited to fit a similar cavity in the bottom of the mould. The table will then return, the ware on the spindles will be shaped, and afterwards deposited on to the holders 8^3, by which they will be carried, by the next movement of the table, under and beyond the detents or holders (11), and then the table will again return, and the pieces of ware carried from the spindles will be prevented returning by the detents or holders (11) which fall as soon as the moulds, &c. have passed under them. The pieces of ware retained by the detents or holders (11) will be moved with the table, at its next movement, under and beyond the holders (12), and will be prevented returning with the table by the detents or holders (12). *g*, *g*, is a trough to receive the waste water which escapes by the pipe g^*; (10) and (10*) are double screw boxes for regulating the pressure of the "profiles," and adjusting the "profile" levers; *x*, *x*, are springs under the spindles *q*, *q*, to compensate, if required, for any irregularity in the thicknesses of the moulds, and give elastic pressure in shaping the ware. The mode of operation of this machine is as follows:—The machine being in action, the table moves to and fro; the spindles being, during the forward movement of the table, below the table, will rise (when the table has attained its farthest point to the right hand) into the bottoms of the moulds, and will lift them from the holders 8^2, at the same time causing the moulds with the clay to revolve. At this moment the "profiles" descend, and press upon the clay, and the taps being opened by the descent of the "profiles," water is supplied, and the clay is formed into the desired shape by the pressure of the "profiles" acting upon the "bats" fixed on the moulds, the motion of the spindles *q*, *q*, being at first rapid (so as to form the article quickly), and then gradually slower (so as to finish it well), by the action of the cam *t*, and strap guide *u*. During this operation the table has returned to its farthest point backward, and has again assumed the position shewn in the Drawing. The spindles *q*, *q*, then drop down by the action of the cams *p*, *p*, leaving the moulds, with the ware upon them, on the holders 8^3, and the "profiles" will rise to allow of the removal of the now-formed ware. The table then moves forward, bringing another set of moulds and "bats" over the spindles, to be formed as before described, and taking those just finished successively under the holders 11 and 12, into a position to be removed into the drying house. Thus they pass on progressively till they are delivered from the machine.

Figure 8 represents an elevation of a machine, seen partly in section, designed for shaping articles of earthenware, china, and other similar substances, by pneumatic pressure in combination with moulds. *a*, *a*, is the frame of the machine; *b*, an air vessel with a plate at the bottom, having a hole in it, with a nozzle *x*; *c* is a piston, having valves opening inwards; *d*, the piston rod, which is actuated by the hand lever *e* and link *f*, or other convenient means; *g* is a bed capable of being raised or lowered by the screw *h* and hand wheel *k*; *l* is a mould similar to those in ordinary use for making teapots and such like articles, and divided into parts, as usual, in order to allow the articles moulded in them to be delivered; *m* is a cylindrical bat of clay made by squeezing the clay through an opening in the bottom of a cylinder, as shewn in Figure 9, in like manner as tubes of clay have heretofore been formed, and as is well understood. *n* is an ordinary flat "bat."

The mode of operation of this machine is as follows:—The "bat" *n* being placed on the convex under part of the mould *l*, and the cylindrical bat *m* introduced, as is shewn in the Drawing, the upper and lower parts of the mould are put together, and placed on the bed *g*, which is then screwed up until the mould *l* comes in contact with the under surface of the air vessel, and by the excess of clay the joint becomes nearly air-tight. It should be observed that, in screwing the upper part of the mould against the bottom of the air vessel, the "bats" *m* and *n* are, by the pressure, perfectly united at their juncture. The piston rod *d* being now lowered, the piston descends in the air vessel, and condenses the air, forcing the bat *m* against the sides of the mould, and thus forming it to the required shape, the air in the mould escaping at the vertical joint. I would remark, that the means of forcing air to cause bats to be pressed thereby, and the moulds used for such purposes, will be varied according to the shape of the article to be made by the presence of air in combination with moulds.

DESCRIPTION OF THE DRAWINGS.

Sheet 2: Figure 1, represents a side elevation of a machine designed for the purpose of forming, pressing, or manufacturing small articles of earthenware, china, &c., such as pomatum or other boxes and cups, and may also be applied for other similar purposes; Figure 2 is an end view of the same; Fig. 3, a longitudinal section taken through the middle of the machine; and Fig. 4 is a horizontal view of the same, as seen from above; these Figures being drawn to a scale of about three inches to the foot. *a*, *a*, is the frame of the machine; *b*, *b*, is the cylinder containing the clay of which the articles are to be formed; *c* is a piston actuated by a screw *d*, which is turned by a handwheel *e*, or otherwise; *f* is a mould or die which fits into the frame of the machine, and is to form the outside of the article to be made, and may be taken out and replaced at pleasure; *g* is a mould which forms the inside of the article, and is attached to the screw *h*, which is turned by the hand wheel *i*; *k* is a small nut with a handle by which the screw and mould *g* may be moved forward without their turning; *l* is a small lever for retaining the cylinder in its proper place.

The mode of working of this machine is as follows:—A mould *f* is placed in the part fitted to receive it, as shewn in the Drawing at Figures 3 and 4, whilst the inside mould *g* is in the situation shewn by the dotted lines in Fig. 3. The mould *g* is then screwed up by turning the hand wheel *i* till it comes into the position represented in the Figures. It will be seen that the space between the two moulds *f* and *g* is of the form of the intended article. The cylinder *b* having been charged with clay, as shewn, the piston *c* is forced up by the screw and hand wheel *e*, and thus presses the clay into the space between the two moulds until it becomes filled, which is indicated by the escape of clay at the opposite ends of the moulds. The inner mould *g* is now to be withdrawn by turning the hand wheel *i*, leaving the article in the mould *f*. A wire is then passed down a narrow space between the mould and the cylinder which separates the clay in the cylinder from that which has been squeezed into the moulds. The mould *f* is then taken away, with the formed article in it, to be dried. This operation may then be repeated, with another mould *f*, for the outside; but the same inside mould is used again and again. A little oil is to be applied to prevent the clay adhering to the moulds, if they be made of metal. It will readily be understood, that it is important that this machine should be so arranged as to allow of the interior die or mould *g* being withdrawn before the article is separated from the clay in the cylinder; for if this separation were made before the mould *g* was withdrawn the article formed would sometimes adhere to one and sometimes to the other of the moulds *g*, *f*, or be destroyed by a partial adherence to both; whereas, by this combination of apparatus, the inner mould is withdrawn whilst the article remains attached to the clay in the cylinder, which keeps it from adhering to the mould *g*.

Fig. 5 represents a side elevation of a machine for forming articles technically called "flat ware," such as plates, dishes, &c., by means of a rolling pressure; Fig. 6 is a front elevation of the same; Fig. 7 is a horizontal view of the machine, as seen from above; and Fig. 8, a vertical section taken through about the middle of the machine in the position shewn in Fig. 5. These Figures are drawn to a scale of about three inches to the foot. *a*, *a*, is the frame of the machine; *b*, *b*, a carriage which runs to and fro upon four rollers *c*, *c*, *c*, *c*; *d*, *d*, is a bed which is attached to the carriage, and may be adjusted by the screws *e*, *e*, *e*, (see Fig. 6) so as to raise or lower it; *f*, *f*, are racks affixed to the sides of the carriage; *g*, *g*, are toothed segments gearing into the racks, and are fastened on the shaft *h*, on which is fixed the lever *k*; *l* is a segment of a cylinder containing the upper mould fastened to the segments *g*, *g*.

This machine is worked in the manner following:—An ordinary mould *m*, with a "bat" of clay upon it, (as formed by the machine represented in Sheet 1, Fig. 1,) is placed upon the bed of the carriage, and is retained in its place by the pins *n*, *n*, *n*. The lever *k* then being depressed, either by hand (as shewn in Fig. 8) or by the crank wheel *o* gearing into a pinion *q* on the same shaft with the driving pulley *p*, (as shewn in Figures 5, 6, 7,) the segments *g*, *g*, act upon the racks *f*, *f*, and the carriage is moved forward on its rollers *c*, *c*, *c*, *c*, the upper mould *l* acting with a rolling motion on the clay, which is thereby pressed upon the lower mould *m*, and is thereby shaped. The upper mould *l* may be made of any suitable material. That shewn in the Drawing is of plaster of Paris, with a casing of wood to strengthen it (see section, Fig. 8); but I also use a metal mould for the same purpose, and then I apply a little oil to it, to prevent the clay adhering to it. Fig. 9 represents a sectional view of a slight modification in the application of the above process, in which the upper moulds are placed round a revolving rim instead of being singly upon a segment. In which case the moulds, with bats, must be successively placed on a suitable bed, on which they can be moved with the movement of the pressing mould.

DESCRIPTION OF THE DRAWING.

Sheet 3: Figure 1 represents a longitudinal section, and Fig. 2 an end view of a machine designed for pressing and filtering " slip " used in the manufacture of china and earthenware, and such like substances, so as to separate a great portion of the water from it, and reduce it to a solid state fit for working. The parts are drawn upon a scale of one inch and a half to the foot. The employment of this machine is intended to dispense with the process of boiling or evaporating the " slip " by heat, and substituting a process of filtration by mechanical pressure; thereby preventing the clay from becoming charged or filled with air bubbles, to which the evaporating process always is liable, and thus preventing the necessity of the subsequent laborious operations of " beating " and " wedging," in order to discharge the air from the clay. *a*, *a*, is the frame of the machine; *b* is a cylinder to contain the " slip;" *c*, *c*, are pistons, each formed of two perforated plates united together, including a space *e*, which space contains a quantity of common sand or other filtering material, enclosed between two sheets of wire gauze or hair cloth. The pistons *c*, *c*, are acted upon by the screws *d*, *d*, or any other convenient means of pressure. *g* is a funnel and valve, opening inwards, for the supply of liquid " slip."

The mode of operating by this machine is as follows:—The " slip " is poured into the cylinder through the funnel until filled, when pressure is applied by turning either or both of the screws *d*, *d*, which closes the valve *g* and compresses the slip between the pistons, forcing out the water through the perforations in them, and through the layers of sand or other filtering material. The pressure is to be continued until the clay is reduced to the proper consistence for working.

A machine, designed as a modification of this process, but acting by the pressure of air into a vacuum, is represented in longitudinal section at Fig. 3, and in a horizontal view, as seen from above, at Fig. 4, being drawn upon a scale of about one inch and a half to the foot, wherein the principal difference is the mode of forming the "slip" at once into "bats," upon a travelling cloth on a table, by the application of atmospheric pressure. The "slip" is to be drawn from the vat or cistern *a*, and conducted, by troughs or otherwise, into the moulds or frames *b*, *b*, *b*, *b*, which may either be circular, as shewn in the Drawing, or of any other required figure. When they are filled the air chamber *c*, *c*, is to be exhausted, and the aqueous part of the "slip" thus pressed by the force of the atmosphere through the perforated top plate *k* of the air vessel, and the bed of sand or other filtering material *d*. The frame *b*, *b*, is then to be raised by a convenient parallel apparatus, as the links *e*, *e*, shewn in dots, in Fig. 3, when the clay will be deposited upon the endless cloth *f*, *f*, distended over the rollers *g*, *g*, in the form of "bats," and may be removed by the doctor *h*, and received upon the table *i* as the cloth traverses across the machine.

Or, as another modification of this operation, the "slip" may be drawn off into a frame the whole width of the travelling cloth, and not divided into separate "bats," and thus formed in a sheet or large "bat," which may be subsequently made continuous or rolled into masses. Or other modifications may be made, so long as the slip is filtered by mechanical or atmospheric pressure into a vacuum.

Figures 5, 6, 7, and 8, represent a peculiar construction of mould for making articles of earthenware, china, and other similar substances by pressure. *a* is an ordinary mould for a plate or other such like "flat" article, and is in an iron case (as seen in section Fig. 6); *b* is a mould to form the back or reverse side of the article, and is formed of two concentric parts b^1 and b^2; *c* is the upper ram of a press, so constructed in two concentric parts that one part projects below the other, and gives pressure to the corresponding or middle part b^1 of the concentric mould b^1. Then the spiral spring *d* gives way until the other part of the ram comes in contact with the outer part b^2 of the mould; and *e* is the lower bed of a press. Thus the pressure is divided, and the article formed with very small pressure, and consequent little liability to break the moulds.

Fig. 9 represents a side elevation of a machine designed for the purpose of printing paper to be transferred to articles of earthenware, china, &c., by means of flat copper or steel plates, and Fig. 10 is an end elevation of the same. *a*, *a*, is the framing of the machine, supporting the press roller *b* and bed roller *c*, and also the roll of paper *d* to be printed; a trough *e* containing size, a colour box *f*, and doctor *g*. There are also two steam chests *h*, *h*, provided, for heating the printing plates. *i*, *i*, represent a continuous series of printing plates, mounted at their ends by means of a clip and stud *k* (see detached Figures 11, 12, 13, 14, and 15) in slots in the endless side chains *l*, *l*, distended over the drums *m*, *m*. This mode of securing the plates will be readily understood by reference to the detached Figures, and which affords great facility in removing or replacing any particular plate, or number of plates required. The spring catch *n* being withdrawn, the stud *k* of the printing plate is allowed to drop into the slot or receptacle in the chain, after which the catch springs back into the position shewn in Figures 11, 12, and 13; thus retaining the stud *k* and plate *i* from falling out when passing over the rollers *m*, *m*.

Fig. 16 represents a side elevation of a novel arrangement of machinery for applying a pattern or device to the paper to be transferred to articles of earthenware, china, &c. by a "stencilling process." *a*, *a*, is the framing of the machine, supporting in bearings the roll of paper *b* intended to receive the pattern, and which passes over the bed or presser roller *c*. The formula or pattern required is pierced or perforated through the endless sheet of parchment or other suitable material *d*, *d*, which is distended over the guide or tension rollers *e*, *e*, *e*, and also the colouring roller *f*, which, on being turned by a winch or other means, the colour roller receives its charge by revolving in the trough of colour *g*, and, as the perforated or pattern cloth passes in contact with the paper between the colour and presser roller, the colour is squeezed through the perforations in the sheet *d*, and thus the pattern or device will be "stencilled," or produced upon the paper, ready for the transferring process.

Having thus described the nature of my Invention, and the manner in which the various operations thereof are to be performed, I desire it to be understood that the particular features of novelty which I claim under the above in part recited Letters Patent are,—

Firstly, the arranging of machinery for producing "bats" of clay, so that the "bats," when cut from a feeding vessel, fall on to moulds or other surfaces, so as to be in a condition to be carried forward and operated on by the subsequent process without handling.

Secondly, the method of fixing "bats" on moulds, (by means of the counter presser, as described in respect to Figures 1, 2, and 3, Drawing Sheet 1,) in order to their undergoing the process of shaping.

Thirdly, the application of profiles on levers having moveable centres of action in place of fixed axes, as heretofore used by me; and also, under this head, the employment of springs, either to the spindles or to the profile levers, as described in respect to Figures 5, 6, and 7, of Drawing Sheet 1; and likewise the employment of a variable speed for the spindles during the operation of forming the article.

Fourthly, the method of forming or shaping articles of clay in or upon moulds by the pressure of air, as described in respect to Figures 8 and 9, of Drawing Sheet 1.

Fifthly, the moulding of articles of china and earthenware, or other similar substances, by expressing the clay into moulds, as *f* and *g*, in manner described in respect to Figures 1, 2, 3, and 4, Drawing Sheet 2.

Sixthly, the mode of moulding articles of china, earthenware, or other similar substances, by means of a rolling pressure, as described in respect to Figs. 5, 6, 7, 8, and 9, of Drawing Sheet 2.

Seventhly, separating water from "slip" by filtration, aided by mechanical pressure or by atmospheric pressure, acting against a vacuum, as described in respect to Figures 1, 2, 3, and 4, of Drawing Sheet 3.

Eighthly, the use of a mould, divided into two or more "concentric" parts, in connection with such a pressure as will cause the force to be applied to them separately at first, and ultimately to them collectively, to complete the operation.

Ninthly, the method of arranging a machine whereby a series of engraved plates are combined, so as to be successively printed from for the purpose of the manufacture of china, earthenware, and other similar substances.

And, tenthly, the arrangement of machinery for working a continuous stencilling apparatus for printing paper for china, earthenware, and other such like substances.

And, in conclusion, I desire it to be understood that I do not intend to confine myself to the precise forms and details shewn in the Drawings hereto annexed, but I claim the right of modifying the apparatus in any way which shall embrace the peculiar features of each part of my Invention, as described above.

In witness whereof, I, the said George Wall, Junior, have hereunto set my hand and seal, this Fourth day of April, in the year of our Lord One thousand eight hundred and forty-four.

GEORGE (L.S.) WALL, Jun^{r}.

R. Richards.

AND BE IT REMEMBERED, that on the same Fourth day of April, in the year above mentioned, the aforesaid George Wall came before our Lady the Queen in Her Chancery, and acknowledged the Specification aforesaid, and all and every thing therein contained, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute in that case made and provided.

Inrolled the Fifth day of April, in the year above written.

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